



PATENT SPECIFICATION

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COMPLETE SPECIFICATION.

Improvements in and relating to the Manufacture of Intaglio Printing Rollers or Cylinders.

We, LANGBEIN - FRANKHAUSER - WERKE AKTIENGESELLSCHAFT, a German Company, of 76, Torgauer Strasse, Leipzig 0, 28, Germany, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to the manufacture of intaglio printing rollers or cylinders having on the permanent surface of the cylinder a thin copper layer, sufficient for one etching, which is mechanically strippable from such surface.

In the processes hitherto known for the manufacture of such intaglio printing rollers or cylinders, the mechanical separability from the cylinder of the copper layer was attained by the provision of a special intermediate layer, so that the copper would not permanently adhere to the cylinder. A metallic alloy of low melting point or a coating of grease, or of graphite or the like was employed as such an intermediate layer. In contradistinction to this, the present invention has for its object to enable the metallic layer serving for the etching and printing to be stripped from the cylinder in another and simpler manner.

The process according to the present invention consists in depositing upon the cylinder the smooth surface of which consists of nickel, cobalt or alloys thereof with or without iron or copper or the like a layer of copper of which the portion first applied is of such different texture or structure from that ordinarily produced by electro-deposition that it is less strongly adherent than the remainder of the layer which is thereafter applied by known methods of electro-deposition.

One method of carrying out the process of the invention consists in producing an initial very thin layer of copper by electro-deposition under abnormal conditions so that the layer is not strongly adherent to the surface of the roller or cylinder and thereafter increasing the layer to the desired thickness by a normal electro-plating operation. It will be apparent that the normal conditions of

electro-plating are conducive to the production of adherent coatings. The departure from the normal conditions of deposition may consist, for example, in producing the initial very thin layer of copper from a potassium cyanide copper bath which contains little or no cyanide not in the form of complex metal salts. The layer is thereupon increased or thickened in a normal acid copper electro-plating bath until a thickness of about 0.10 to 0.15 mm. is obtained, which suffices for one etching. The copper deposit obtained in this way can be completely removed from the smooth, permanent surface of the cylinder in a purely mechanical manner by stripping off or unrolling, without detrimentally affecting the smooth surface of the cylinder.

In carrying this invention out in practice a potassium cyanide copper bath may be employed which contains about 70 to 100 grams of pure crystalline copper potassium cyanide and 20 grams of caustic soda per litre. So long as this bath liquor is not coloured blue, and thus contains no uncombined copper cyanide, it must be heated with 8 to 5 grams of copper cyanide per litre which combines with the free potassium cyanide forming copper potassium cyanide. In this electrolyte a carefully polished and degreased nickel coated cylinder is copper plated by rotating it for 1 or 2 minutes under a current density of about 0.3 to 0.5 amps. per square decimetre. Afterwards the cylinder is plated in a normal copper plating bath while being rotated, with or without simultaneous polishing by agate, until the necessary thickness of copper layer for etching has been produced. In this case a normal acid copper bath can be used which contains e.g. 220 grams of copper sulphate and 15 grams of sulphuric acid per litre. The current density may be 3 to 10 amps per square decimetre.

The invention includes an intaglio printing roller or cylinder having thereon a copper layer rendered mechanically strippable by having the portion adjacent to the smooth surface of the roller or cylinder of said different texture or

structure from that of the remainder that it is less strongly adherent to such surface than the coatings ordinarily produced by electro-deposition.

- 5 A particularly simple and advantageous mode of carrying out the process of the present invention consists in employing the cylinder, the smooth surface of which is formed, for example, of polished nickel, first for a short time as the anode, whilst continuously rotating it, in a copper acid copper electro-plating bath, and then coating it by electro-deposition in known manner until the desired thickness of 15 copper has been obtained. This may be accomplished simply by reversing the current so that the cylinder becomes the cathode. In this case the whole operation can be carried out in a single electro-plating bath. The portion of the copper layer adjacent to the smooth surface of the roller or cylinder is of such different texture or structure that the layer is less 20 strongly adherent than the coatings ordinarily produced by electro-deposition. This probably results from passivation of the surface of the cylinder or from the liberation of oxygen at this surface during the anodic treatment. The outer part of the layer, however, is of the texture or 30 structure usually desired for etching and printing.

If it is desired to perform the electro-deposition at a higher temperature, such as between 80 and 50° C., as is usual in practice for speedier results, it is advisable, in order to prevent a possible anodic action on the permanent surface of the cylinder by the sulphuric acid ions, to 40 add to the bath chromium salts or similarly acting substances which promote the passivation of the cylinder surface.

- In this case about 2 to 10 grams of 45 chromium sulphate per litre may be added to a normal acid copper plating bath which contains, for example, 220 grams of copper sulphate and 15 grams of sulphuric acid per litre. The cylinder with a carefully polished and degreased nickel coating is put in the copper bath and connected up as the anode for about 30 seconds at a current density of 5 amps. per square decimetre while being continuously rotated. Then the current is 55 reversed and the normal copper plating commenced. The copper deposits first in brown colour by which the difference in structure or texture of the copper by the anodic passivation of the nickel surface is visibly evident. The brown colour rapidly changes over to the usual light yellow colour of the copper. The time of copper coating is about 2 to 8 hours 60 according to whether the cylinder is

wholly or partly immersed in the electrolyte. The current density is about 5 to 10 amps. per square decimetre.

The body of the cylinder or roller will usually consist of iron or steel or other strong material, such as aluminium, brass, copper, bronze or the like for reasons of economy, and its casing or outer surface consists of nickel or cobalt or an alloy of nickel and cobalt or an alloy of these two metals with iron or copper and the like. If after long use any destruction of the permanent surface of the cylinder takes place, which however generally only happens when many copper layers have been applied and again removed, the cylinder casing or surface can be restored, in known manner, for example by electro-plating e.g. with nickel or by mechanical 85 plating or welding and by subsequent polishing.

Having now particularly described and ascertained the nature of this invention and in what manner the same is to be performed, we declare that what we claim is:—

1. Process for the manufacture of intaglio printing rollers or cylinders formed of or coated with nickel or cobalt or an alloy of nickel and cobalt or an alloy of these two metals with iron or copper or the like, having thereon a copper etching layer mechanically strippable and sufficient only for one etching, which consists in depositing upon the smooth surface of the cylinder a layer of copper of which the portion first applied is of different texture or structure from the remainder of the layer which is thereafter applied by ordinarily produced 105 electro-deposition.

2. Process as claimed in claim 1 in which an initial very thin layer of copper is produced by deposition from a potassium cyanide copper bath which contains little or no cyanide not in the form of complex metal salts and then a further coating of copper, completing the mechanically strippable layer to the desired thickness, is deposited thereon from a customary copper electro-plating bath. 115

3. Process as claimed in claim 1 in which the cylinder is first employed for a short time as the anode in a customary acid copper electro-plating bath while being continuously rotated and is then coated by electro-deposition in known manner until the desired thickness of copper has been deposited. 125

4. Process as claimed in claim 1 in which the cylinder is first employed for a short time as the anode in a customary acid copper electro-plating bath and is then employed as the cathode in the same 130

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bath until the desired thickness of copper has been deposited.

5. Process as claimed in claims 3 or 4 in which chromium salts or similarly acting substances are added to the electroplating bath to promote passivation of the cylinder surface and prevent anodic attack of such surface.

6. An intaglio printing roller or cylinder, formed of or coated with nickel or cobalt or an alloy of nickel and cobalt or an alloy of these two metals with iron or copper or the like, having thereon a copper layer sufficient only for one etching and rendered mechanically strippable

by having the portion adjacent to the smooth surface of the roller or cylinder of different texture or structure from the portion completing the layer to the desired thickness which is applied by ordinary produced electro-deposition.

7. Process for the manufacture of intaglio printing rollers or cylinders substantially as described.

8. Intaglio printing rollers or cylinders substantially as described.

Dated this 7th day of April, 1902.

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